Centurion University of Technology and Management

Vizianagaram Pin: 535003, A.P, India (2022-2023)

"E-VEHICLE ASSEMBLE AND SERICE TECHNOLOGY"

A Project report submitted in the partial fulfilment of the award of a degree of

BACHELOR OF TECHNOLOGY

IN

ELECTRONICS AND COMMUNICATION ENGINEERING

By

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CERTIFICATE

This is to certify that the project work entitled **"ELECTRIC VEHICLE ASSEMBLE"** is a fulfilment of project work done by**, GUNDA SWAPTHIKA-211801410011,** for the degree of **BACHELOR OF TECHNOLOGY** in **ELECTRONICS AND COMMUNICATION ENGINEERING**, Centurion **University of Technology and Management**, during the academic year 2022-2023.

Mr KISHOR MOHAN PATRO

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EXAMINER **HEAD OF THE DEPARTMENT** **EXTERNAL**

ACKNOWLEDGEMENT

It is with at most pleasure and excitement we submit our project partial fulfillment of the requirement for the Bachelor of Technology.

The project is a result to the cumulate efforts, support, guidance, encouragement, and inspiration from many of those for whom we must give our truthful honor and express gratitude through bringing out this project at the outset as per our knowledge.

We express our appreciativeness to **Mr KISHOR MOHAN PATRO -Associate professor**, who facilitated us to providing the friendly environment which helped to enhance our skillsin present project.

DECLARATION

We hereby declare that the project entitled "vehicle assemble and service technology **"submitted** to the fulfilments of the degree of **B. TECH (ECE)** in **Centurion University of Technology and Management.** This project work in original has not been submitted so far in any part or full for any other university or institute for the award of any degree.

GUNDA SWAPTHIKA - 211801410011

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ELECTRIC VEHICLE ASSEMBLE

ABSTRACT

E-Rickshaw is the most convenient and safe mode of local transportation of two or four passengers. E-rickshaw are commonly available in India and other parts under developed & developing countries for hiring on small rentals for limited time. Apart from E-Rickshaw, company will also make E-Rickshaw which can carry weight up to 300 kgs. E-Rickshaw drivers will obtain license through which he/she can drive E-rickshaw in city. The entire assembly and fabrication work for mfg. E-Rickshaw performed in a highly automatic plants. Rims, Tyres, Brakes, Headlight, Taillight, Horn, Turning Lights & Traction Batteries, wire Harness, Throttle, Motor, & Controllers are purchased from the AIS approved companies. Where as Company will make chasis & assemble the body parts along with painting & Testing of the vehicle within the premises.

INTRODUCTION

E-rickshaws Introduction are becoming increasingly popular as a sustainable mode of transportation. This presentation will cover the o an e-rickshaw, from raw materials to finished product. Electric vehicles are either partially or fully electric. EVs are becoming increasingly popular because they have low running costs and are environmentally friendly. EVs have electric motors that power the vehicle. Electric vehicles (EVs) are automobiles powered by one or more electric motors that run on electricity stored in rechargeable batteries or other energy storage devices. They are considered a promising solution to reduce greenhouse gas emissions, dependency on fossil fuels, and air pollution caused by traditional internal combustion engine vehicles.EVs come in various forms, including battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), and hybrid electric vehicles (HEVs). While PHEVs and HEVs combine electric and internal combustion engines, BEVs rely solely on electric power.

WELDING PROCESS

- Welding is a fabrication process whereby two or more parts are fused together by means of heat, pressure or both forming a join as the parts cool. Welding is usually used on metals and thermoplastics but can also be used on wood. The completed welded joint may be referred to as a welding.

- The welding process in e-vehicles involves joining metal components together using heat and pressure to create a strong and durable bond. Welding is commonly used in the construction and assembly of various parts of an e-vehicle, such as the frame, chassis, body panels, and other structural components. Here's a simplified explanation of the welding process in e-vehicles:

- **Preparation**: Start by preparing the surfaces to be welded. This involves cleaning the metal surfaces to remove dirt, rust, or any contaminants that could affect the welding quality. Ensure that the work area is well-ventilated and free from flammable materials.

- **Material Selection**: Determine the appropriate welding method and filler material based on the type of metal being welded. Common metals used in e-vehicles include steel and aluminum. Different welding techniques and filler materials are suitable for each metal type.

- **Welding Equipment Setup**: Set up the welding equipment based on the chosen welding method. This typically involves preparing the welding machine, selecting the appropriate welding electrode or wire, and adjusting the machine settings for voltage, current, and wire feed speed.

- **Joint Preparation**: Prepare the metal components to be joined by aligning them correctly and ensuring proper fit-up. This may involve cutting, shaping, or beveling the edges of the metal components to create a suitable joint geometry for welding.

- **Welding Technique**: Apply the appropriate welding technique based on the chosen method. Common welding methods used in e-vehicles include.

PAINTING PROCESS

- Painting is the practice of applying paint, pigment, color or other medium to a solid surface (called the "matrix" or "support"). The medium is commonly applied to the base with a brush, but other implements, such as knives, sponges, and airbrushes, can be used.

- The painting process in e-vehicles involves applying paint or coatings to the surfaces of the vehicle's body panels, frames, or other components to enhance their appearance, provide protection, and achieve a desired finish. Here's a simplified explanation of the painting process in e-vehicles:

- **Preparation**: Start by preparing the e-vehicle for painting. This involves cleaning the surfaces to be painted to remove dirt, grease, or any contaminants that could affect the paint adhesion. Ensure that the work area is well-ventilated and free from dust or debris.

- **Surface Repair**: Inspect the surfaces for any dents, scratches, or imperfections. Repair these areas by sanding, filling with body filler, or using other appropriate techniques to ensure a smooth and even surface for painting.

- **Color Coat Application**: Apply the desired color coat or multiple coats to achieve the desired color and finish. Use a spray gun or other suitable paint application tools to ensure an even and consistent coating. Allow each coat to dry before applying the next, following the recommended drying times.

- **Clear Coat Application**: Apply a clear coat over the color coat to provide glossiness, durability, and protection to the painted surface. Similar to the color coat, apply multiple coats of clear coat with proper drying intervals between each coat.

- **Drying and Curing**: Allow the painted surfaces to dry and cure as per the manufacturer's recommendations. This typically involves a curing period during which the paint fully hardens and reaches its maximum durability.

CHASSIS

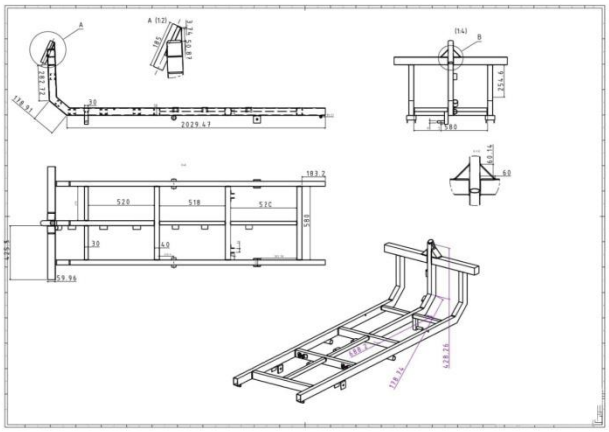
The chassis of an electric vehicle (e-vehicle) is the structural framework that supports all the major components of the vehicle. It provides the strength, rigidity, and durability required for the safe operation of the vehicle. The chassis design of an e-vehicle is crucial for optimizing weight, aerodynamics, and overall performance.

Here are some common types of chassis used in e-vehicles:

Monocoque: This chassis design integrates the body and chassis into a single structure. The body panels themselves provide the structural support, reducing the overall weight of the vehicle.

Body-on-Frame: In this design, the body of the vehicle is mounted on a separate frame. The frame acts as the main structure, providing strength and stability, while the body panels serve primarily as an enclosure.
Space Frame: A space frame chassis consists of a network of lightweight, interconnected tubular structures that form the vehicle's frame.

Skateboard Platform: The skateboard platform is a unique chassis design used in some electric vehicles, particularly in electric cars with a flat battery pack.



FRONT AXLE ASSEMBLE

The front axle assembly of an electric vehicle (e-vehicle) consists of various components that work together to support the front wheels, transmit power, and enable steering. Here are the key components typically found in the front axle assembly of an e-vehicle:

Front Suspension: The front suspension system includes components such as control arms, ball joints, springs, and shock absorbers. These components provide support, absorb road shocks, and allow for controlled movement of the wheels, ensuring a smooth and comfortable ride.

Wheel Hubs and Bearings: The front axle assembly includes wheel hubs that house the bearings, which allow the front wheels to rotate smoothly. The wheel hubs are mounted onto the steering knuckles and connect the wheels to the axle assembly.

Brake System: The front axle assembly incorporates the brake system, including brake calipers, brake pads, and brake rotors. When the driver applies the brakes, the calipers squeeze the pads against the rotors, creating friction and slowing down or stopping the vehicle.

REAL AXLE ASSEMBLE

The rear axle assembly of an electric vehicle (e-vehicle) consists of various components that support the rear wheels, transmit power, and contribute to the overall stability and performance of the vehicle. Here are the key components typically found in the rear axle assembly of an e-vehicle:

Rear Suspension: The rear suspension system includes components such as control arms, springs, shock absorbers, and sometimes a rear anti-roll bar. These components provide support, absorb road shocks, and allow for controlled movement of the rear wheels, contributing to a smooth and comfortable ride.

Differential: The differential is a crucial component in the rear axle assembly of a vehicle with rear-wheel drive or all-wheel drive. It distributes power from the electric motor(s) to the rear wheels while allowing them to rotate at different speeds during turns. The differential helps maintain stability and traction.

Driveshafts/CV Axles: In e-vehicles with rear-wheel drive or all-wheel drive, the rear axle assembly includes driveshafts or Constant Velocity (CV) axles. These shafts transmit power from the electric motor(s) to the rear wheels, propelling the vehicle forward.

Wheel Hubs and Bearings: The rear axle assembly includes wheel hubs that house the bearings, allowing the rear wheels to rotate smoothly. The wheel hubs are mounted onto the axle assembly and connect the wheels to the drivetrain.

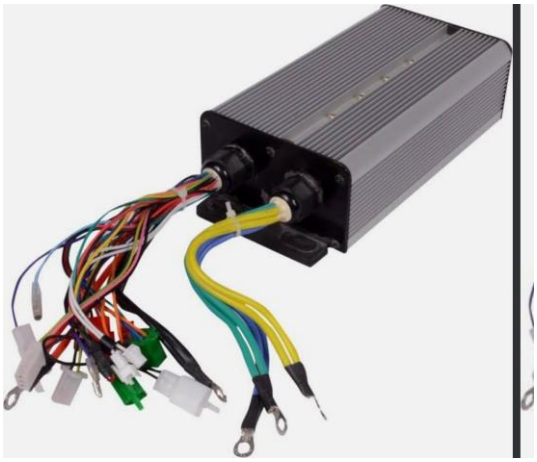
Brakes: The rear axle assembly incorporates the brake system, including brake calipers, brake pads, and brake rotors. When the driver applies the brakes, the calipers squeeze the pads against the rotors, creating friction and slowing down or stopping the vehicle.

Motor(s): In some e-vehicles, especially those with rear-wheel drive or all-wheel drive, the electric motor(s) may be integrated into or near the rear axle assembly. In such cases, the motor(s) directly power the rear wheels, eliminating the need for driveshafts

Controller

The controller of an electric vehicle (e-vehicle) is a crucial component that manages and controls various aspects of the vehicle's electric drivetrain. It is responsible for coordinating the operation of the electric motor(s), battery system, and other related systems to ensure optimal performance, efficiency, and safety

- **Power Management**: The controller oversees the power flow between the battery pack and the electric motor(s). It regulates the amount of power delivered to the motor(s) based on driver input, system demands, and operating conditions.
- **Motor Control**: The controller governs the operation of the electric motor(s) by regulating the motor's speed, torque, and power output. It receives input from various sensors, such as throttle position, vehicle speed, and traction control, to adjust the motor's performance and maintain desired vehicle behavior.
- **Battery Management**: The controller monitors and manages the battery system to optimize its performance and extend its lifespan.
- **Regenerative Braking**: Many e-vehicles utilize regenerative braking, where energy is recovered during braking and stored back into the battery.
- **System Monitoring and Diagnostics**: The controller continuously monitors various sensors and components throughout the e-vehicle. It detects faults, malfunctions, and abnormal conditions, and provides diagnostics and error codes for troubleshooting and maintenance.
- **Vehicle Safety and Protection**: The controller incorporates safety features and protection mechanisms to ensure the reliable and safe operation of the e-vehicle
- **Communication and Interface**: The controller often interfaces with other vehicle systems, such as the vehicle's display unit, infotainment system, and connectivity modules.



DC TO DC CONVENTOR

DC-to-DC conversion plays a crucial role in electric vehicles (EVs) by managing the power flow between various systems and components. The primary purpose of a DC-to-DC converter in an electric vehicle is to step down the high-voltage battery voltage to a lower voltage suitable for powering auxiliary systems and charging the 12-volt battery.

Here's a brief overview of the DC-to-DC conversion process in an electric vehicle:

- **High-Voltage Battery**: Electric vehicles typically have a high-voltage battery pack that supplies power to the electric motor for propulsion. This battery pack provides a DC voltage, which is typically several hundred volts.

- **DC-to-DC Converter**: The DC-to-DC converter, also known as a voltage converter or a DC-DC buck-boost converter, is responsible for converting the high-voltage DC power from the battery pack to a lower voltage DC power required by auxiliary systems.

- **Auxiliary Systems**: Electric vehicles have various auxiliary systems that require power, such as the lighting system, infotainment system, HVAC (Heating, Ventilation, and Air Conditioning), power steering, and other electronics.
- **Voltage Conversion**: The DC-to-DC converter steps down the high-voltage DC power from the battery to the lower voltage required by the auxiliary systems.

- **Charging the 12-Volt Battery**: In addition to powering the auxiliary systems, the DC-to-DC converter also charges the 12-volt battery used in electric vehicles.

MOTOR

The motor is a fundamental component of an electric vehicle (e-vehicle) that converts electrical energy into mechanical power to propel the vehicle. It is responsible for driving the wheels and providing the necessary torque and rotational force. Here are some key aspects and types of motors used in e-vehicles:

- **Electric Motor Types:**

a. Permanent Magnet Synchronous Motor (PMSM): PMSM is a common type of motor used in e-vehicles. It consists of permanent magnets on the rotor and a stator with windings. PMSMs offer high efficiency, compact size, and good power-to-weight ratio.

b. Induction Motor: Induction motors, also known as asynchronous motors, use electromagnetic induction to generate rotational force.
c. Switched Reluctance Motor (SRM): SRMs have a simple construction with a rotor that has salient poles and a stator with windings.
d. Brushless DC Motor (BLDC): BLDC motors use electronic commutation instead of mechanical brushes found in traditional DC motors.

- **Motor Placement:**

a. In-Wheel Motor: In some e-vehicles, the electric motor(s) are directly integrated into the wheel hub, creating an in-wheel motor configuration. This setup eliminates the need for a traditional drive train, simplifies the vehicle's design, and enables independent control of each wheel.

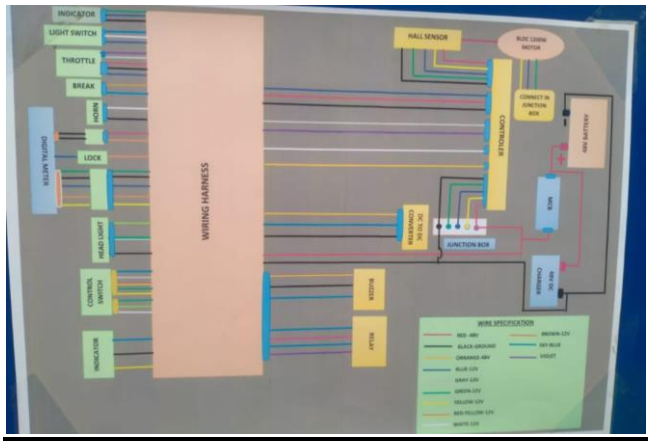
b. Central Motor: In other e-vehicles, the motor is centrally located in the vehicle, often near the axle or the transmission. The motor's rotational force is then transferred to the wheels via a driveshaft, belt, or chain, depending on the vehicle's drivetrain configuration.

- **Motor Control and Power Electronics:** The motor is controlled by a motor controller, also known as an inverter or motor drive. The motor controller receives signals from various sensors and the vehicle's control system to regulate the motor's speed, torque, and power output.

Wiring hardness

IA battery consists of two or more electric cells joined together. The cells convert chemical energy to electrical energy. The cells consist of positive and negative electrodes joined by an electrolyte. It is the chemical reaction between the electrodes and the electrolyte which generates DC electricity. In the case of secondary or rechargeable batteries, the chemical reaction can be reversed by reversing the current and the battery returned to a charged state. The ‘lead acid’ battery is the most well known rechargeable type, but there are others. The first electric vehicle using rechargeable batteries preceded the invention of the rechargeable lead acid by quarter of a century, and there are a very large number of materials and electrolytes that can be combined to form a battery. However, only a relatively small number of combinations have been developed as commercial rechargeable electric batteries suitable for use in vehicles. At present these include lead acid, nickel iron, nickel cadmium, nickel metal hydride, lithium polymer and lithium iron, sodium sulphur and sodium metal chloride. In this lecture the different types of the energy storage devices are presented. The following topics are covered in this lecture:

- Overview of Batteries
- Battery Parameters
- Lead acid batteries
- Lithium ion batteries
- Metal air batteries
- Battery Charging



Batteries

Batteries are a critical component of electric vehicles (e-vehicles) as they provide the energy storage necessary to power the vehicle's electric motor(s). Here are some key aspects of batteries used in e-vehicles:

- **Battery Types:**

a. Lithium-ion (Li-ion) Batteries: Li-ion batteries are the most common type of batteries used in e-vehicles. They offer a high energy density, long cycle life, and good power-to-weight ratio. Li-ion batteries are available in various chemistries, including lithium iron phosphate (LiFePO4), lithium nickel manganese cobalt oxide (NMC), and lithium nickel cobalt aluminum oxide (NCA).
b.Solid-State Batteries: Solid-state batteries are an emerging technology that offers the potential for higher energy density, improved safety, and faster charging compared to traditional Li-ion batteries. c. Other Battery Technologies: While less common in e-vehicles, other battery technologies like nickel-metal hydride (NiMH) and lithium-polymer (LiPo) batteries have been used in some early electric vehicle models.

- **Energy Density and Range**: The energy density of a battery determines the amount of energy it can store per unit weight or volume. Higher energy density batteries allow for longer driving ranges and smaller battery packs, which can contribute to lighter and more compact e-vehicles.

- **Battery Management System (BMS):** The BMS is a critical component that monitors and manages the battery pack's performance, health, and safety. It balances cell voltages, controls charging and discharging processes, monitors temperature, and protects against overcharging, over-discharging, and overheating.
- **Charging Infrastructure**: E-vehicles require a charging infrastructure to recharge their batteries. This includes charging stations at various locations, such as homes, workplaces, public areas, and dedicated fast-charging stations. Charging methods can vary from standard AC charging (e.g., Level 1 and Level 2) to high-power DC fast charging (e.g., Level 3 or DC fast charging).
- **Battery Lifespan and Degradation**: Battery lifespan and degradation are important factors in e-vehicle battery performance. The lifespan of a battery is typically measured in cycles, where one cycle represents a full charge and discharge.
- **Recycling and Sustainability**: Battery recycling and disposal are crucial considerations to minimize the environmental impact of e-vehicles.

CONCLUSION

- The manufacturing process of an e-rickshaw involves several important steps, from design to quality control.
- By using high-quality materials and components, manufacturers can ensure that e rickshaws are safe, reliable, and sustainable modes of transportation.
- The e-vehicle project is an exciting endeavor that involves the design, development, and manufacturing of electric vehicles.
- The frame design of the e-vehicle plays a crucial role in providing structural integrity and support for other components.
- should be carefully engineered to ensure optimal strength, safety, and weight distribution, taking into consideration factors such as material selection, frame geometry, and manufacturing techniques.